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(54) A rotary crank mechanism

(57) A crank arm for operating a mechanism used to move a component of a motor vehicle, for example a window or sliding roof, comprises a part 1 integral with a screw 6 meshing with a toothed quadrant 21. A crank arm part 2 of the crank arm is pivoted to the part 1 about an axis 3 near its end and carries a handle 5 which in an inoperative position is received within a cavity 9 within the screw 6.

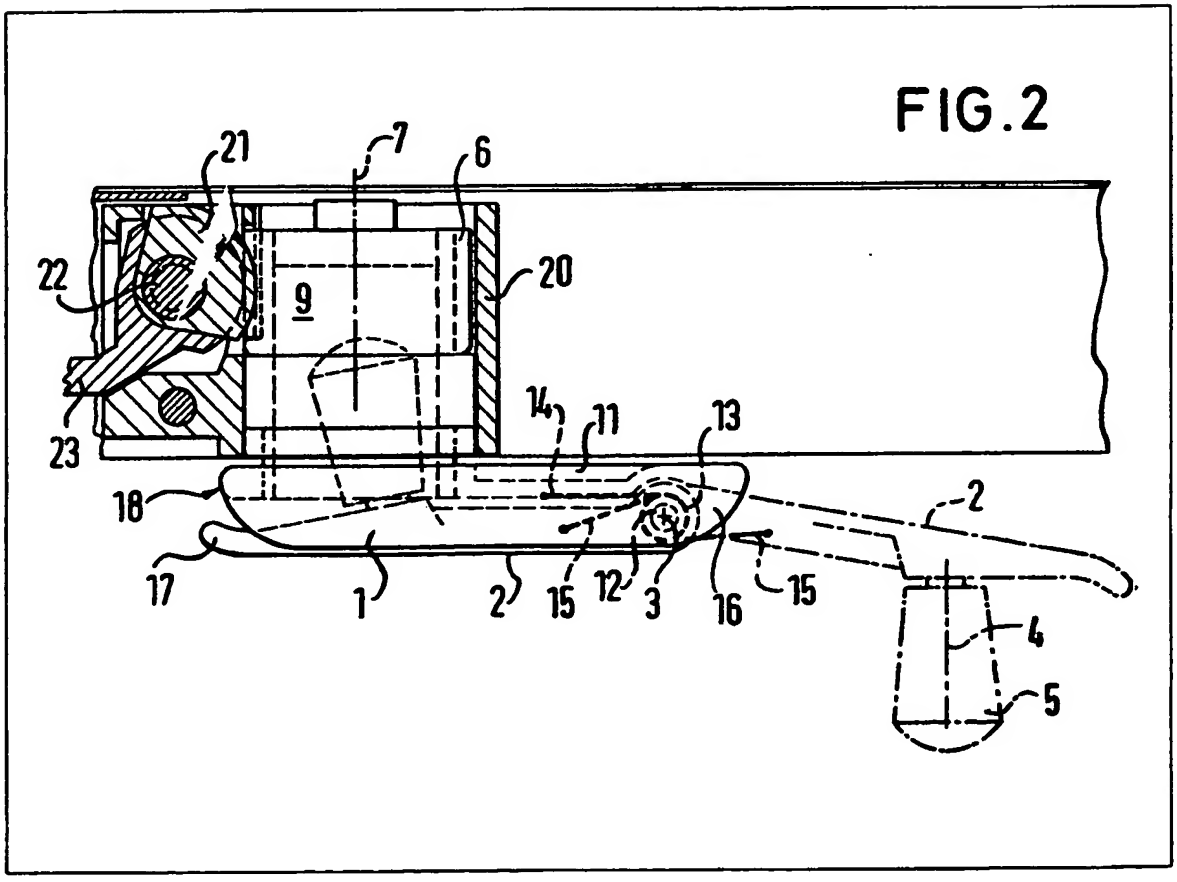

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FIG.1

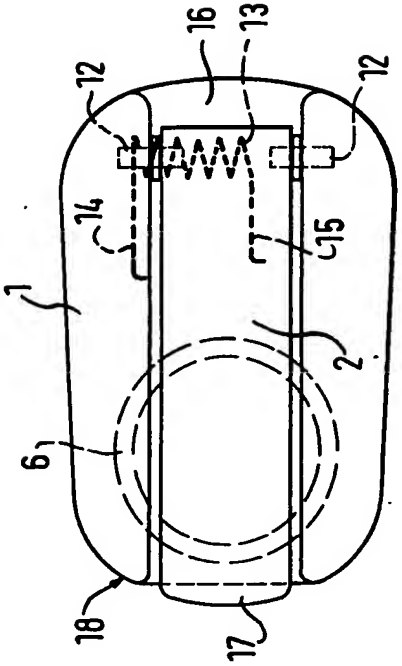


FIG.2

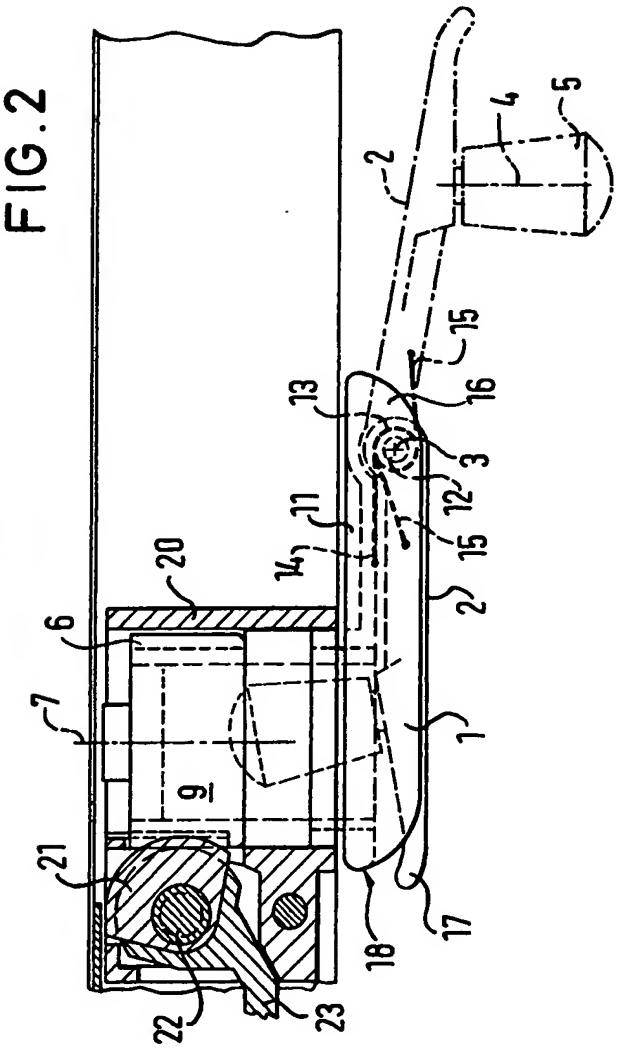
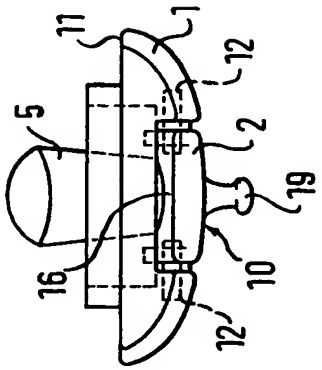


FIG.3



SPECIFICATION

A rotary crank mechanism

In motor vehicles, for example, use is often made of rotary crank mechanisms for adjusting seats, as well as for opening and closing side windows and slidable or sunshine roofs. As a rule, a crank mechanism for this purpose comprises a crank arm which carries a handle and is journalled in bearings in a part of the vehicle such that the handle projects into the passenger compartment substantially perpendicularly to the surface of the part provided with the mechanism. A disadvantage of this type of crank is that the handle constitutes a possible source of injury to passengers, especially in the event of an accident.

An attempt has been made to overcome this problem, particularly in connection with a vehicle sliding roof or ventilation flap, by arranging the crank arm so that it has a rest position within a generally complementary trough in the roof surface. Although the risk of injury to passengers is hereby considerably reduced, this solution does not permit adjustments to be made in an optimum fashion, since the crank arm can be received in the trough only in a specific rotational position. A roof or ventilation flap can, therefore, have only a certain number of open positions. Similar problems would arise if such a crank mechanism were used to operate a window.

To overcome the problems discussed above, it is herein proposed that a rotary crank mechanism should comprise a power transmission element with respect to which is articulated a crank arm part carrying a handle capable of being received at least partially within a cavity in said element when the crank arm part is pivoted from an extended operative position into a retracted position. In the preferred construction to be described herein, the crank arm part constitutes a first part articulated to a second crank arm part projecting radially from the power transmission element. In the extended position of said first part, the handle is accessible to the user for the purpose of rotating the mechanism, whereas in the retracted position, the handle is prevented from forming an obstruction and the surface of the crank arm presented to the interior of the vehicle is the rear side of the first crank arm part. The power transmission element may take the form of a screw, shaft, gear or toothed quadrant for example and may be made in one piece with, or be secured to the second crank arm part. In either case, the cavity in the power transmission element may communicate with or merge into a channel in the second crank arm part, said channel serving to receive the first crank arm part when it occupies its retracted position. A crank mechanism of this construction may be produced and assembled with minimum expense and allows on the one hand an easy and rapid actuation of the part to be moved and, on the other, offers no danger to the passengers. Any part of a vehicle which is capable of being moved in response to the rotation of a crank may be actuated by the proposed mechanism. When the crank arm is in its inoperative position with the said first crank arm part retracted, the space which it occupies is extremely small. Since the handle is received at least partially within a cavity in the power transmission element itself, the space required to install the proposed mechanism is not increased, at least to any significant extent, beyond that required to install the known type of crank mechanism. The edges of the second crank arm part, as well as the end portions of the first crank arm part, may be rounded so that when the first part occupies its retracted position, conveniently nested within the channel in the second part, the crank arm presents to the interior of the vehicle no more than a bulge or hump on the interior surface of the vehicle part provided with the mechanism. Obstruction to the interior space of the vehicle is reduced to a minimum while the risk of injury being caused by the crank arm is in this way substantially, if not entirely, eliminated.

Conveniently, the two crank arm parts have substantially equal lengths and are articulated about an axis transverse to the axis of the power transmission element. Conveniently, the two parts are articulated together by means of two aligned pivot pins, the first part being biased into its closed position conveniently by a coil spring, in order to ensure its return to this position after use.

To facilitate movement of the first crank arm part into its extended position, its free end may project fractionally beyond the end of the second crank arm part in order to provide a finger portion which may project generally towards the surface on which the mechanism is mounted. This finger piece may be easily engaged by the user to enable the first crank arm part to be levered into its extended position. Alternatively, however, the first crank arm part may be provided with a pull member, for example, in the form of a button, loop or the like, made of flexible plastics material, but of such a design that it does not form an obstruction capable of causing injury.

Alternatively, the first crank arm part may be held in its retracted position by a compression spring catch which is released when the first crank arm is depressed, thereby causing this part to leave the channel in which it is received.

The second crank arm part may be secured to the power transmission element by any suitable and known fixing means, conveniently of a detachable nature. Alternatively, and more preferably, the second crank arm

part is formed in one piece with the power transmission element, conveniently by die-casting, so that first crank arm part and the power transmission element form a single component in which the cavity for receiving the handle is formed. The two crank arm parts may be made in different ways from die-casting, moulding from plastics or otherewise, and advantageously the faces which are presented to the interior of the vehicle when the first part is in its retracted position are provided with a padded cover, particularly when the parts are die-cast from metal.

In the drawings:

Figure 1 is a plan view of a crank mechanism in accordance with the present proposal, showing the retracted position of the first crank arm part,

Figure 2 is a partial section taken through the mechanism shown in Fig. 1, depicting both the extended and retracted positions of the first crank arm part, and

Figure 3 is an end view of a modification.

Referring to Figs. 1 and 2, a movable part of a motor vehicle, for example a sliding roof or window, is operated by a crank mechanism supported by structure, such as the roof, wall or door of the vehicle. Force is transmitted to the movable part from a pivot arm 23 housed within the structure and rotatable together with a toothed quadrant 21 about a pivot axis 22. Motion is imparted to the toothed quadrant from a power transmission element in the form of screw 6 which is rotatable about an axis 7 by crank arm accessible from the interior of the vehicle.

In accordance with the present proposal, the crank arm is of two part construction consisting of interarticulated parts 1 and 2. The crank arm part 1 is cast in one piece with the screw 6 or otherwise fixedly secured thereto and is formed along its length with a channel 8 into which opens a cavity 9 formed axially within the screw 6. The crank arm part 2 is articulated to the crank arm part 1 by means of a pair of coaxial pivot pins 12 carried by either part and projecting into eyes in the other, adjacent an end of the part 1 remote from its axis of rotation 7 so that the part 2 may be moved from a retracted position shown in dashed lines in Fig. 2 in which the part is received substantially or wholly within the channel, into the extended position shown in chain lines. A handle or knob 5 is rotatably supported upon the crank arm part 2 for rotation about an axis 4 and, in the retracted position of the part 2, the handle is received at least in part within the cavity 9 in the power transmission element.

The part 1 has a flat base or undersurface 11 and the edges of the part 1 and the end portions of the part 2 are rounded (see Fig. 2 and Fig. 3 depicting a modification) in the form of an arc towards the base 11 so that when the part 2 is in its retracted position, the crank arm appears as a bulge or hump on the surface on which it is provided.

A coil spring 13 encircles the axis 3 and has one limb 14 engaging the crank arm part 1 and another limb 14 which engages the crank arm part 2, so as to bias the part 2 towards its retracted position to ensure that the crank arm always adopts its folded inoperative position after use.

The crank arm is opened by pivoting the part 2 against the bias of the spring into the position shown in chain dotted lines wherein a stop face 16 abuts the arm part 2 and holds it in a set angular position diverging from the surface of the wall, such that the axis 4 of handle 5 is parallel to the axis 7 of rotation of the crank. In the retracted position of the crank arm part 2, the handle 5 adopts a position within the recess 9 at an angle to the axis 7.

The free end portion 17 of the part 2 projects beyond the end 18 of the part 1 by a small distance and is inclined towards the supporting wall in order to form a finger piece spaced from the plane of the base 11 and the wall surface, enabling the crank arm to be opened.

The construction, part of which is shown in Fig. 3, corresponds to that described above, except that the part 2 has no projecting portion 17 but is instead provided with a knob 19 of flexible plastics material, arranged adjacent the free end of the part 2, making it easier to release.

It will be appreciated that any movable part of a motor vehicle capable of being actuated by a crank may be operated by the mechanism herein proposed, and may be fixed in any desired position, since the proposed mechanism is self-locking and the crank may occupy any rotational position following rotation and may therein be closed by moving the crank arm part 2 into its retracted position.

CLAIMS

1. A rotary crank mechanism, in particular for actuating a moving part of a motor vehicle, comprising a crank arm constructed from two interarticulated parts, a first of which parts carries a handle capable of being received at least in part within a cavity in a power transmission element fast with a second crank arm part when said first part is pivoted from an extended position into a retracted position.

2. A mechanism according to claim 1, wherein the second crank arm part has a longitudinally extending channel in which the first crank arm part is nested in its retracted position.

3. A mechanism according to claim 1 or claim 2, wherein the two crank arm parts are of substantially equal length and are interarticulated about an axis extending transversely of the axis of rotation of the power transmis-

sion element.

4. A mechanism according to any preceding claim, wherein the articulation between the two crank arm parts is constituted by a pair of aligned pins, the second crank arm part being biased by resilient means into its inoperative position.

5. A mechanism according to any preceding claim, wherein the free end of the first crank arm part projects beyond the second crank arm part when in the retracted position, thereby to form a finger piece.

6. A mechanism according to any of claims 1 to 4, including a compression spring catch retaining the first crank arm part in the inoperative position.

7. A mechanism according to any of claims 1 to 4, including a pull element carried by the free end of the first crank arm part.

8. A mechanism according to any preceding claim, wherein the second crank arm part is integral with the power transmission element and the cavity therein opens through the second crank arm part.

9. A mechanism according to any one of claims 1 to 7, wherein the second crank arm part is detachably connected to the power transmission element and has an opening communicating with the cavity therein.

10. A mechanism according to any preceding claim, wherein the edges of at least the second crank arm part are rounded.

11. A mechanism according to any preceding claim, wherein at least one of the crank arm parts is formed from plastics material or a die-cast member.

12. A mechanism according to claims 11, wherein at least one of the crank arm parts has a padded covering.

13. A rotary crank mechanism substantially as hereinbefore described with reference to Figs. 1 and 2 alone, or as modified by Fig. 3 of the drawings.

14. A rotary crank mechanism comprising a power transmission element with respect to which is articulated a crank arm part carrying a handle capable of being received at least partially within a cavity in said element when the crank arm part is pivoted from an extended, operative position into a retracted, inoperative position.

15. A rotary crank mechanism as claimed in claim 14, wherein the said crank arm part is articulated to a crank arm part projecting radially from the said element.

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